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Report of the
Board of Regents

National Library of Medicine

Long Range Plan Executive Summary

U.S. Department of Health and Human Services
Public Health Service
National Institutes of Health

Overview of the NLM Long Range Plan

Cover:

A system for quantitative DNA analysis using image processing

The NLM Long Range Plan is published as a series of 7 reports:

An *Executive Summary* sketches the background against which the Long Range Plan may be viewed, and it extracts highlights from the Board of Regents Report.

The *NLM Long Range Plan (Report of the Board of Regents)* presents detailed and specific recommendations and estimated resource requirements over the next 3 years for accomplishing the Library's long range goals.

Panel reports 1 through 5 contain the substance of the five advisory planning panels' discussion in each of the five principal domains of NLM activity:

Panel 1: Building and organizing the Library's collection

Panel 2: Locating and gaining access to medical and scientific literature

Panel 3: Obtaining factual information from data bases

Panel 4: Medical informatics

Panel 5: Assisting health professions education through information technology

Readers who wish further details should consult appropriate volumes in the series. Limited copies are obtainable from:

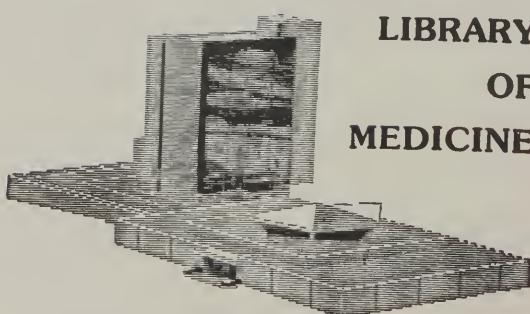
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**Report of the
Board of Regents**

National Library of Medicine

Long Range Plan Executive Summary

Foreword

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It has been my privilege to serve on the Board of Regents of the National Library of Medicine (NLM) from 1982 to 1986. Succeeding Dr. Martin Cummings, Dr. Donald Lindberg began as the NLM Director in August 1984, the same month I began as Chairman of the Board of Regents. In our early informal talks together, Dr. Lindberg and I shared a belief in the importance of the NLM and the need for this great institution to prepare for its role in the changing scene of American medicine and science. The Library's distinguished history reflects its evolution as the world's greatest repository of biomedical information. Further, the Library staff has continually searched for ways to make its sources more available to scientists, clinicians and the public. Without question, the National Library of Medicine has become the intellectual center of the world's biomedical information network. To continue that role, some changes in mission and operations would be necessary.

In these early discussions, Dr. Lindberg and I agreed that the Library could best plan its future activities and resource requirements only after a careful examination of its mission and the requirements of its users. The new and different realities of the 21st century are coming into focus and changes to accommodate this new world are inevitable. At the direction of the Board of Regents a long range planning project was organized. It was presented to the Regents at the June 1985 meeting, and received their enthusiastic endorsement.

Consultants were identified, panels appointed, and the project launched in the Fall of 1985. The marvelous efforts of the panel members enabled each group to generate a report with recommendations. I believe that every user population was represented in the discussions held during the several meetings of the five panels and nothing overlooked in the long range plan.

This plan is intended to serve the public, the Congress, the HHS Secretary, future regents and the Director of NLM and staff in their decision making about the Library's future activities. Public and private financial support will be necessary to underwrite these enormously important functions. It is my hope that the plan and its interrelated component parts will be made known to the Secretary and the Congress and will help those leaders understand and appreciate the National Library of Medicine. Further, support from the private sector may be desirable for certain activities and the plan should help identify such areas.

In developing the plan, the Regents have been ably assisted by the Library staff and, particularly, its Director. The Board of Regents enthusiastically supports the plan and will help to encourage its successful implementation

L. Thompson Bowles, M.D., Ph.D.
Dean for Academic Affairs
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Chair
Board of Regents
National Library of Medicine
1985-1986

Preface

The responsibility of the National Library of Medicine is to 'assist the advancement of medical and related sciences, and to aid in the dissemination and exchange of scientific and other information important to the progress of medicine and to the public health.' The Library had done this well in the past. Yet rapid changes in science, in health care practices, in the uses of information technology, and in American public policy concerning all these issues bring us pause to re-study how best to fulfill our responsibility during the coming decades.

This Report embodies a central challenge to the National Library of Medicine to strive to be certain that health care in America and the advancement of biomedical research toward this end will benefit from the dazzling technological discoveries that are available to us now from computer and information science, telecommunications engineering, physics and chemistry. In the past, the Library has established a distinguished record of scholarly leadership in medicine. This Report emphasizes the present urgent need for improved access by health care professionals and scientists to the fast growing scientific literature of newly discovered biomedical concepts, treatments, and preventatives—across a wide range of practical and theoretical problems. The most encouraging aspect of this Report is the recommendation that the Library move as quickly as possible to translate the existing "raw" technology of computers, information, and engineering sciences into products and services that through its insight and understanding of the special biomedical practices and needs can improve health care in America.

No one doubts that even finer developments await us in the coming years. Yet even today there exist outside of medicine, advanced systems for knowledge representation, country-wide inquiry and communication, and decision support for military, financial, industrial, and intelligence applications. What seems needed now is to adapt these general and useful technologies to the specific jobs of biomedicine. Progress might eventually come in any case, but a concerted effort on the part of the National Library of Medicine could speed this up, bringing laboratory advances and discoveries closer to the bedside and the clinic.

A word must be said about priorities among the current, the enhanced, and the new activities that this Report recommends. It does not prescribe a fixed sequence of steps by which the entire plan and all its objectives are to be accomplished. The construction of a functioning operational plan will be developed by NLM and its Board of Regents within resource limitations. This Report is more a map for the future and a set of opportunities that await NLM action and program development. The advisors and the Board of Regents are no doubt fully aware that the urgency of the need to support NLM's planned programs for the Nation's good must necessarily be balanced by the Congress and the Executive against all other needs for resources. In addition, many of the proposed programs are dependent upon full understanding and enthusiastic endorsement and support by the constituencies of the Library most affected.

Yet, the Report clearly recognizes several outstanding considerations. NLM's fundamental priority certainly is to sustain the collections of the Library and to provide better access; or, stated another way, to provide high quality library and information services to the biomedical community. Actions toward this goal include continued refinement of collections and preservation programs, improvements to the electronic system for end-user access, and modernization of our information support services.

The top priority for our discretionary efforts must be to prepare the Library and the Nation's health professionals for the optimal utilization of the burgeoning electronic technologies for knowledge management. Of the numerous initiatives the plan proposes as components of this preparation, one in particular stands out. This is the "window of opportunity" presented to the Library in the field of molecular biology and biotechnology. Attention to this opportunity—through the provision of advanced information handling services—will permit NLM to contribute significantly to discovery of new principles and treatments by health-care professionals and scientists.

As a direct result of the insight gained through the long range planning efforts embodied in this Report, NLM is already giving prime emphasis within the bounds of our current resources to research efforts to develop integrating and coordinating systems for the factual data bases in molecular biology/biotechnology. These efforts now involve a number of advanced techniques recommended in the Report, including extension of the Unified Medical Language System to molecular biology, interconnectivity of the existing data bases through electronic gateways and networks, and new knowledge representation designs.

I welcome the Report and its recommendations. On behalf of the National Library of Medicine staff, I wish to thank most sincerely all those who so graciously contributed their time, effort, and thoughts to this careful and salient statement.

Donald A.B. Lindberg, M.D.
Director, National Library of Medicine

**Report of the
Board of Regents**



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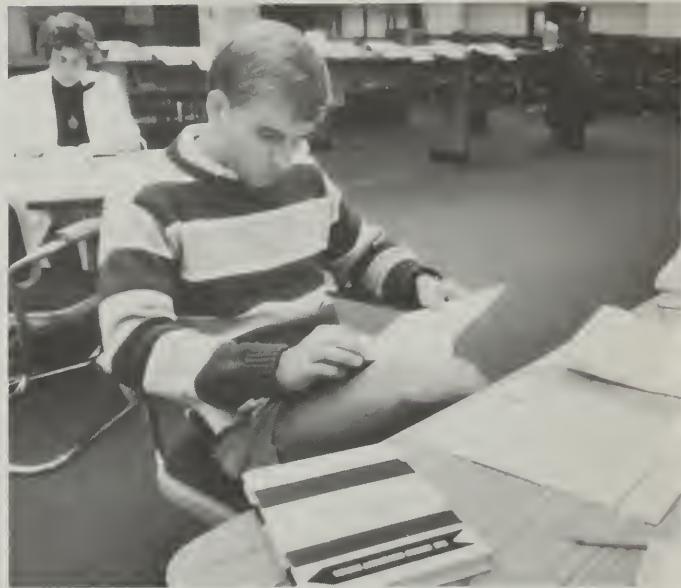
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Introduction

This is an Executive Summary of the Long Range Plan of the NLM (National Library of Medicine), issued by its Board of Regents. The Plan is the product of a year-long process that drew upon the expertise of a broad range of health professionals, scientists, library and information experts, and other specialists. The full report represents a comprehensive plan for the Library as it approaches the twenty-first century.

The Plan is published as a series of reports. The Report of the Board of Regents presents detailed and specific recommendations and estimated resource requirements over the next 3 years for accomplishing the Library's long range goals. Panel reports 1 through 5 contain the substance of the five advisory planning panels' discussion in each of the five principal domains of NLM activity:

- 1 Building and Organizing the Library's Collection
- 2 Locating and Gaining Access to Medical and Scientific Literature
- 3 Obtaining Factual Information from Data Bases
- 4 Medical Informatics
- 5 Assisting Health Professions Education through Information Technology



This Executive Summary sketches the background against which the Long Range Plan may be viewed, and it extracts highlights from the Report of the Library's Board of Regents. Among the highlights are important new initiatives in biotechnology, preservation, medical informatics, networking, and a Unified Medical Language System. Also included in this summary are resource recommendations of the Board of Regents covering the first 3 year period of implementation of the Long Range Plan.

Readers who wish further details should consult the full Report of the Board as well as the reports of the five advisory panels.

Background

The amount of information about the human body, its processes, and the threats to which it is exposed is truly staggering. Consider:

Three young boys are rushed to a hospital, victims of a lightning strike. Unsure of the best course, the resident quickly taps into MEDLINE to search for articles covering treatment of lightning injuries in children under the age of twelve. In fifteen minutes, the resident has a complete list of articles on burns and heart damage from lightning, which he credits with the timely and effective treatment of the three children.

There is scarcely a medical question that can be posited that does not have an answer in the medical literature. The answer may be incomplete; it may (and probably will) change as we learn more, but, nevertheless, information does exist to guide the health professional. The Nation's continuing investment in biomedical research ensures that the amount of this information will continue to expand rapidly.

The National Library of Medicine is mandated by law to acquire and preserve this information as it is embodied in the biomedical literature, to organize it so that it may be retrieved, and to disseminate the information so that it may advance the health of the American public. For more than 150 years it has labored to serve the varied needs of health practitioners, medical scientists, and students of the health sciences. From the *Index Medicus*, the first systematic classification of the world's medical literature (called by William Welch the greatest American contribution to medicine in the 19th century), to the development, almost a century later, of computerized data bases for rapidly retrieving information, the Library has been a leader in applying innovative methods to disseminate vitally needed health information.

The Library also engages in and supports research and development into new and more effective methods of information transfer. NASA satellites, microwave television, computer-based voice-recognition systems, video disks and compact disks, and artificial intelligence techniques are examples of the many technologies the Library has used to improve biomedical communications. A variety of health-related subjects have benefited from information systems developed by the Library: medical education, toxicology, handling hazardous materials, cancer research, population and reproduction, bioethics and health-care administration, to name a few.

Origin of the Plan

The Board of Regents is charged with advising the Secretary of Health and Human Services on important matters of policy affecting the Library. Mindful of this duty, the Board two years ago began to consider the Library's future in light of the increasingly important role of information in American medicine and science.

The Regents took note of the accelerated growth of the medical literature, the special challenges and opportunities presented by the scientific revolution in molecular biology, and the remarkable advances in electronic systems technology for storing and communicating information. Such trends, they concluded, present NLM with an opportunity to play an even greater role in improving the Nation's health by improving biomedical communications. Accordingly, the Regents requested that a long range strategy for the Library's future be devised, and they sought out the assistance of experts to develop it.

Physicians, nurses, dentists, veterinarians, librarians, editors, publishers, educators, and participants from industry, biomedical professional associations, information services, and health insurance companies enthusiastically responded to the call. This broad diversity of occupations and expertise reflects the constituencies of the Library and the variety of needs and interests it serves. More than one hundred outstanding individuals willingly gave their attention to the process. The Board of Regents is grateful for their wisdom and values their ideas for the Library's future.

The vision of the planners is both dazzling and simple. They posit nothing less than a nationwide system that will provide immediate, authoritative answers to questions posed by health professionals. Often these answers may come from systems based on the medical literature—either bibliographic or full text—but they may also come from knowledge bases, expert systems, or other computer-based and network-accessible collections of information.

The Board of Regents acknowledges that, although the Library's mandate clearly covers such a system, it would be wise for NLM to involve others in building it. The Library can provide the vision and leadership, but it will require broad collaboration among academic institutions, national and international organizations, professional societies, libraries, publishers, and computer hardware and software developers if such a goal is to be achieved.

The sections that follow briefly abstract the main features from the Board of Regents' Long Range Plan. The order follows a logical flow, from maintaining the collection, to improving access to literature-based information and factual data bases, to developing computerized medical question-answering and problem-solving systems, to using new technology to improve the education of health professionals.

Goals and Recommendations

The NLM Collection

The National Library of Medicine is the “library of record” for medicine and the allied health sciences. That is, NLM is responsible for assuring access to all significant information in biomedicine, by acquiring, organizing and preserving the published record of the health sciences. To make the information contained in this vast collection readily accessible, NLM catalogs and indexes the items required, describing and classifying their content using a thesaurus and classification specially developed for biomedicine.

The NLM collection serves as a backup for all U.S. biomedical libraries. The assurance that its comprehensive collection will be maintained and preserved allows other libraries to rely on NLM for items that are infrequently requested as well as for the long-term preservation of the scholarly record of biomedicine. This sharing of responsibility has saved millions of dollars nationally and results in rapid and effective service for the professions.

NLM must not only continue to collect the biomedical literature comprehensively, it must respond adaptively to two kinds of changes: in the subjects that are relevant to medicine, and in the physical format of the literature. The explosion of knowledge in molecular biology, for example, has provided new insights into the genetic bases of disease and made large blocks of basic biological science newly relevant to medicine. Correspondingly, the “literature” of genetic engineering is increasingly “published” in the form of electronic records that are accessible to desk-top computers. Ironically, at the same time the Library copes with new physical formats, preservation of the old—paper—becomes increasingly important. This is because of the inevitable deterioration of much of the paper used in publishing since the late nineteenth century.

Recommendations: The 9 specific recommendations of the Board of Regents related to Building and Organizing the Library's Collection concern:

- The need to work with the producers of electronically published materials so that such material acquired for the collection will be manageable;
- Carrying out the recommendations of the NLM Preservation Plan to cope with the problem of deteriorating paper; and
- Improving NLM's indexing and cataloging by using computer and artificial intelligence techniques, and enriching the bibliographic records created by NLM.



Access to the Literature

The world's greatest collection of biomedical literature is of little use if it is not accessible. The Nation's investment in medical research cannot be realized until the resulting information is effectively in the hands of the professional community. Today's technological advances present new opportunities for gaining access to medical information; its actual transfer is now less a physical than an electronic process. Libraries of the future will evolve into a powerful interlocking system of networks to bring together information resources and users.

For such a system to evolve fully, there are a number of issues that need resolution. How will the electronic data bases and "publications" be distributed, and under what arrangements will they be accessible? Libraries now subscribe to journals for a fixed fee, regardless of how many readers scan a particular article, whereas online information is typically sold by the hour and each user charged. Libraries buy whole books, even though most readers consult only a single chapter, but electronic "books" can be selectively copied from a host computer to a user's personal computer. Will books and journals be distributed on optical disks, magnetic tape, or some as yet undeveloped media? What standards and conventions will be adopted for updating the electronic information, and what safeguards will be in place to protect it from unauthorized insertions or deletions?

This section of the Long Range Plan approaches the question of access from two aspects: how to improve the organizational structure through which medical information is provided, and how to improve the information tools available to the individual user.



The primary points of focus for the former are the existing RML (Regional Medical Library) Network and the developing IAEMS (Integrated Academic Information Management Systems) program, both of which were created by NLM and receive Federal funding. The Plan calls for a wider integration of information resources and facilities to form a more extended infrastructure through which future services may be provided.

The RML Network, with its 4,000 members, is a remarkably successful example of inter-institutional cooperation for the public good, primarily for speedily providing copies of books and journal articles to health professionals. The Network offers an ideal test-bed for applying new communications technology and for developing new information delivery systems. The IAIMS projects, on the other hand, are primarily intra-institutional, being created within academic health centers. They hold out the promise of integrating into one system all significant sources of information within a complex academic medical enterprise.

Shifting from the institutional to the individual, the Long Range Plan emphasizes the needs of health care practitioners who require direct and convenient access to information. Before optimum "user-friendly" information tools and services can be created for health care professionals, however, the Library needs to know more about their information-seeking and information-using behavior. The Plan also addresses the role of health-science librarians and information specialists, and how this role must change with the changing technology. Finally, the increasing demand for health information on the part of the lay public is addressed. What is the responsibility of the National Library of Medicine for collecting, organizing, and disseminating popular health information?

Recommendations: The 16 specific recommendations of the Board of Regents related to Locating and Gaining Access to Medical and Scientific Literature concern:

- The need to continue support of the Regional Medical Library Network and the Integrated Academic Information Management Systems and to ensure that they adopt the best in modern communications technology;
- Developing connections ("interfaces") among bibliographic data bases so as to create a seamless network that may be accessed easily by health professionals;
- Developing more efficient systems for reference services, bibliographic searching, providing documents; and improving existing systems such as NLM's new GRATEFUL MED; and
- The Library's role in developing new educational programs for information professionals and the need to study NLM's role in providing health information to the public.

Factual Data Bases

Bibliographic data bases are pointers to information located elsewhere. Factual data bases contain the sought-after fact or, in the case of advanced "intelligent" systems, can calculate or derive the answer from stored data. The Library is concerned with three kinds of computerized factual data bases: those designed for the protection of the public health and environment; those that provide information of special interest to biomedical scientists; and those linked in some fashion to health care and practice.

Within the first category, the Library offers several factual data bases that describe the effects of chemical substances on humans, other biological systems, and the environment. The HSDB (Hazardous Substance Data Bank) is one such factual data base. It is clear that the Library should not be the sole provider of information about hazardous chemicals. However, multiple sources of information risk duplication of expensive efforts and are difficult to use effectively even by an experienced information specialist. As the Library's factual data bases are used increasingly for responding to emergencies, it has become apparent that simplified access methods and improved means of validation and reliability testing are needed.

A prime example of the second category of factual data bases—those of interest to scientists—is the Report's proposal that the Library take the lead in linking together data banks of genetic and molecular biology information. This whole area has come to be known as "biotechnology." Because of the complexity of biological systems, the amount of molecular biology data at various levels—from cells and tissues through successively smaller genetic units—is enormous, and growing rapidly as a result of research. Enormous, too, however, are the potential benefits as scientists unravel the mysteries of the genetic code.



The third category—data bases for the practitioners—will become increasingly necessary for high quality medical care. There is a staggering amount of knowledge available to the health-care professional, and more is announced every day from the nation's laboratories. The information with which every young physician is equipped on entering practice declines in validity with the passage of time. The Library already provides practitioners with direct and simple access to its major bibliographic data bases. Needed now are factual data bases of practice-linked information that may be joined with "reasoning" computer programs. These will result in knowledge-based systems to help physicians make diagnoses and to suggest treatment regimens.

Recommendations: The 11 recommendations of the Board of Regents related to Factual Data Bases concern the need for the Library to:

- Enhance the content and facilitate access to the HSDB and other factual data bases for public health and environmental protection;
- Establish services and linkages for biotechnology information; and
- Establish a collaborative program to develop data bases for medical practitioners.

Medical Informatics

Medical informatics studies biomedical information, data, and knowledge—their storage, retrieval, and optimal use for problem solving and decision making. The emergence of medical informatics as a new discipline is due not only to advances in technology, but to the awareness that knowledge is becoming unmanageable by traditional paper-based methods, and to a growing conviction that the *process* of decision making is as important as the factual base on which clinical decisions or research plans are made.

Processing information faster or more efficiently—which today's technology can easily accomplish—is not sufficient. What is needed are new and more powerful information management tools. These include (a) frameworks for organizing and encoding medical knowledge, (b) methods for acquiring and representing judgmental knowledge that is based on medical experience rather than formal studies, (c) computer networks to permit efficient communication among health personnel, and (d) systems to provide customized, expert advice to practitioners.

To accomplish this, the Report calls for the Library, through its Lister Hill Center, to conduct research and development that would be a significant component of the overall effort in medical informatics. Among the subjects of such research would be the development of a Unified Medical Language System (UMLS), and expert systems based on artificial-intelligence techniques. The UMLS, already begun by the Library, is an initiative of extreme importance that may lead the health professions out of today's bewildering maze of eclectic terminology that impedes the use of automated information systems. The Report also outlines the kind of research the Library would support in medical informatics with grants and contracts to other institutions.



Recommendations: The 10 specific recommendations of the Board of Regents related to Medical Informatics concern:

- The development by the Library, in collaboration with private and other Federal organizations, of a Unified Medical Language System;
- The need for NLM to support the building of expert systems and a prototype national communications system for research in medical informatics; and
- The support by NLM of "Centers of Excellence in Medical Informatics" and the expansion of its present grant program to conduct research and to train a cadre of experts in the field.

Health Professions Education

The amount of available medical information has long since expanded beyond the ability of any one person to master it all. One valid response to this information overload is to use modern technology to provide easy access to needed information. Students can be given fewer "facts" (likely as not soon to become outmoded) and more tools, so they may seek the latest information when confronted with a problem. Training with modern methods of information management during students' formative years will greatly enhance their effective functioning as health-care professionals committed to life-long learning.

Significant advances in information technology have occurred since the early applications of drill-and-practice computer-aided instruction of two decades ago. Computer-based "interactive" programs can not only simulate living systems graphically but portray the consequences of a student's intervention into the system. Computerized patients have the ability to survive an infinite number of student mistakes. More complex are computer-based systems that can be voice activated, and systems that model and adapt to the user's cognitive style, providing moving and still images, texts, and graphics as aids to learning and tests of mastery.

Computer-based information systems are not limited to the formal years of instruction. Students will learn how to use technology to personally acquire, store, and manage information. Future health-care practitioners can be expected to make routine use of computer-based knowledge management systems that combine a number of information resources: clinical records; selective published knowledge; continuing self-education; and quality assurance review.

Recommendations: The 6 specific recommendations of the Board of Regents related to Health Professions Education concern:

- The role of NLM in developing prototype computer-based learning programs and in promoting awareness of such programs within the health education community; and
- The need for NLM to create a special program of grant support to develop prototype knowledge management systems for practitioners.

Resource Requirements

Although some of the activities contained within the report can be accomplished with existing resources, a number of the recommendations for achieving the Board's long range goals clearly are for advanced or expanded activities above and beyond NLM's current workload and commitments. Thus, while all are logical extensions of current activities, the majority will require additions to both NLM's fiscal appropriations and Full Time Equivalent personnel allocation in order to fulfill the responsibilities and opportunities identified in this plan.

The following budget tables present the Board's estimates of:

- Budgetary resources aggregated by domain;
- Effect of additional resources according to budget activities.

Board of Regents Planning Budget for the National Library of Medicine
 FY 1986-FY 1990 by Domain
 (Dollars in Thousands)

	1986 Actual			1987 Conference Allowance		
	Extramural	Intramural	Total	Extramural	Intramural	Total
Domains						
The NLM Collections	\$ —	\$17,243	\$17,243	\$ —	\$19,214	\$19,214
Access to the Literature	6,646	7,354	14,000	7,263	7,434	14,697
Factual Data Bases	357	2,540	2,897	400	3,437	3,837
Medical Informatics	5,251	3,250	8,501	6,567	3,680	10,247
Health Professions Education	—	2,976	2,976	—	3,100	3,100
Subtotal	12,254	33,363	45,617	14,230	36,865	51,095
Research Management and Support						
Extramural Management				1,316		1,473
Program Management				4,090		4,376
Subtotal				5,406		5,849
NIH Management Fund						
Total, NLM				4,250		4,894
				\$55,273		\$61,838

Board of Regents Estimate

1988			1989			1990		
Extramural	Intramural	Total	Extramural	Intramural	Total	Extramural	Intramural	Total
\$ —	\$22,859	\$22,859	\$ —	\$23,344	\$23,344	\$ —	\$23,314	\$23,314
13,763	10,819	24,582	14,763	11,689	26,452	15,763	12,709	28,472
400	16,192	16,592	400	16,192	16,592	400	16,192	16,592
20,467	9,230	29,697	25,017	11,430	36,447	29,612	14,230	43,842
5,250	5,200	10,540	3,500	5,200	8,700	3,650	4,950	8,600
<u>39,880</u>	<u>64,300</u>	<u>104,180</u>	<u>43,680</u>	<u>67,855</u>	<u>111,535</u>	<u>49,425</u>	<u>71,395</u>	<u>120,820</u>
	1,723			1,723			1,723	
	4,526			4,526			4,526	
	<u>6,249</u>			<u>6,249</u>			<u>6,249</u>	
	4,894			4,894			4,894	
	<u>\$115,323</u>			<u>\$122,678</u>			<u>\$131,963</u>	

Board of Regents Planning Budget for the National Library of Medicine
 FY 1986-FY 1990 by Budget Activity
 (Dollars in Thousands)

	1986 Actual	1987 Conference Allowance	FTEs	Board of Regents Estimate			FTEs
				1988	1989	1990	
Extramural Programs							
Medical Library Assistance	\$7,530	\$9,410		\$22,410	\$21,910	\$23,310	
Medical Informatics	4,724	4,820		17,470	21,770	26,115	
Subtotal	12,254	14,230		39,880	43,680	49,425	
Intramural Programs*							
Library Operations	25,384	27,791	304	33,746	35,076	36,041	322
Lister Hill Center	8,915	10,386	78	20,861	23,086	25,661	120
Toxicology Information Program	3,314	3,582	31	4,867	4,867	4,867	42
Biotechnology Information	—	—	—	9,720	9,720	9,720	34
Subtotal	37,613	41,759	413	69,194	72,749	76,289	518
Research Management and Support							
Extramural Management	1,316	1,473	19	1,723	1,723	1,723	24
Program Management	4,090	4,376	72	4,526	4,526	4,526	75
Subtotal	5,406	5,849	91	6,249	6,249	6,249	99
Total, NLM	\$55,273	\$61,838	504	\$115,323	\$122,678	\$131,963	617

*Includes NIH Management Fund

NLM Planning Process

In January, 1985 the Board of Regents of the National Library of Medicine resolved to develop a long range plan to guide the Library in wisely using its human, physical, and financial resources to fulfill its mission. The Board recognized the need for a well-formulated plan because of rapidly evolving information technology, continued growth in the literature of biomedicine, and the need to make informed choices of intermediate objectives that would lead NLM toward its strategic, long range goals. Not only would a good plan generate goals and checkpoints for management, actually a map of program directions, but it would also inform the various constituencies among the Library's users about the future it sought and could help to enlist their support in achieving that future.

At the Board's direction, a broadly based process was begun involving the participation of librarians, physicians, nurses, and other health professionals; biomedical scientists; computer scientists; and others whose interests are intertwined with the Library's. A total of 77 experts in various fields accepted invitations to serve on one of the five planning panels. Each panel addressed the future in one of the five domains that encompass NLM's current programs and activities. The domains, which provided the panels a framework for thinking about the future are:

1. Building and organizing the Library's collection
2. Locating and gaining access to medical and scientific literature
3. Obtaining factual information from data bases
4. Medical informatics
5. Assisting health professions education through information technology

The Library chose a planning model with three components. First, it incorporates a general, somewhat indistinct vision of the future 20 years from now in medicine, library and information science, and computer-communications technology. That environment cannot be forecast precisely, but we can speak of a "distant" goal. That goal is seen as a societal objective whose

attainment involves many organizations and agencies. NLM has a major role to play in achieving the goal and must plan its part. Second, while the 20-year goals are indistinct, there are opportunities for and impediments to achieving them. The opportunities and impediments can be more clearly envisioned because they appear to lie roughly 10 years away. Third, the specific steps that should be taken to remove the impediments and take advantage of the opportunities should be programmed for 3 to 5 years.

The planning process also involved participation within the Library. The Director provided his version of the future in the form of a "Scenario: 2005," which was distributed to panel members and Library staff. NLM staff prepared background documents that reported NLM achievements in the five domains, and reviewed current planning. Senior NLM staff members also acted as resource persons to the planning panels.

At the end of the planning process, each panel formulated recommendations and priorities for future NLM programs and activities in the domain under its purview. The five panel reports were reviewed by the Board of Regents in June 1986. The Board then asked the NLM staff to analyze and reconcile their findings, eliminating any duplications and consolidating the recommendations. Together with the planning panel reports, this synthesized plan presents the official Long Range Plan of the Board of Regents of the National Library of Medicine.

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